

## CLAIMS

What is claimed is:

- 1    1. A composition comprising lubricant and at least a first antioxidant and a second  
2    antioxidant, the first antioxidant being a hindered phenolic and the second antioxidant being a  
3    thioether.
  
- 1    2. The composition of claim 1 wherein the first antioxidant is selected from the group  
2    consisting of 2,4-dimethyl-6-octyl-phenol; 2,6-di-t-butyl-4-methyl phenol (i.e., butylated  
3    hydroxy toluene); 2,6-di-t-butyl-4-ethyl phenol; 2,6-di-t-butyl-4-n-butyl phenol; 2,2'-  
4    methylenebis(4-methyl-6-t-butyl phenol); 2,2'-methylenebis(4-ethyl-6-t-butyl phenol); 2,4-  
5    dimethyl-6-t-butyl phenol; 4-hydroxymethyl-2,6-di-t-butyl phenol; n-octadecyl-beta(3,5-di-t-  
6    butyl-4-hydroxyphenyl)propionate; 2,6-dioctadecyl-4-methyl phenol; 2,4,6-trimethyl phenol;  
7    2,4,6-triisopropyl phenol; 2,4,6-tri-t-butyl phenol; 2-t-butyl-4,6-dimethyl phenol; 2,6-methyl-  
8    4-didodecyl phenol; tris(3,5-di-t-butyl-4-hydroxy isocyanurate, tris(2-methyl-4-hydroxy-5-t-  
9    butylphenyl)butane; octadecyl-3,5-di-t-butyl-4-hydroxy hydrocinnamate;  
10   tetrakis{methylene(3,5-di-t-butyl-4-hydroxy-hydrocinnamate)}methane; 2,2'-oxamido  
11   bis{ethyl-3-(3,5-di-t-butyl-4-hydroxyphenyl)}propionate; 1,2-bis(3,5-di-t-butyl-4-  
12   hydroxyhydrocinnamoyl)hydrazine; 1,3,5-tris(3,5-di-t-butyl-4-hydroxybenzyl)-s-triazine-2,4,6-  
13   (1H,3H,5H)trione; 1,3,5-tris(4-t-butyl-3-hydroxy-2,6-dimethylbenzyl)-s-triazine-2,4,6-  
14   (1H,3H,5H)trione; 1,3,5-trimethyl-2,4,6-tris(3,5-di-t-butyl-4-hydroxybenzyl)benzene; 3,5-di-t-  
15   butyl-4-hydroxyhydrocinnamic acid triester with 1,3,5-tris(2-hydroxyethyl)-5-triazine-  
16   2,4,6(1H,3H,5H)-trione; bis(3,3-bis(4-hydroxy-3-t-butylphenyl)butanoic acid)glycolester;

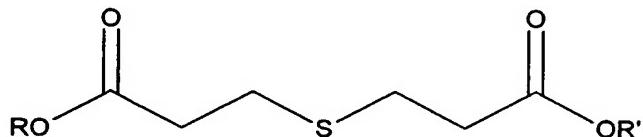
17      tetrakis{methylene (3,5-di-t-butyl-4-hydroxy-hydrocinnamate)}methane; and 1,3,5-trimethyl-  
18      2,4,6-tris(3,5-di-t-butyl-4-hydroxybenzyl)benzene.

1      3.      The composition of claim 1 wherein the first antioxidant is butyl-3-(3,5-di-tert-butyl-4-  
2      hydroxyphenyl)propionate.

1      4.      The composition of claim 1 wherein the second antioxidant is a dialkyldithiopropionate  
2      of the structure:

3

4



1

7      wherein R and R' are independently selected from the group consisting of straight chain and  
8      branched chain alkyl groups.

1      5.      The composition of claim 1 wherein the second antioxidant is  
2      ditridecyldithiopropionate.

1      6.      The composition of claim 1 wherein the ratio the first antioxidant to the second  
2      antioxidant is in the range of from about 70:30 to about 30:70.

**0206-PA**

1       7.     The composition of claim 1 further comprising at least one additional additive selected  
2     from the group comprising dispersants, detergents, rust inhibitors, antioxidants, metal  
3     deactivators, antiwear agents, antifoamants, friction modifiers, seal swell agents, demulsifiers,  
4     VI improvers, and pour point depressants.

1       8.     The composition of claim 1 wherein the lubricant is a lubricating oil.

1       9.     A composition comprising:  
2           A)    a lubricant;  
3           B)    butyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate;  
4           C)    ditridecyldithiopropionate; and, optionally,  
5           D)    at least one additional additive selected from the group comprising dispersants,  
6     detergents, rust inhibitors, antioxidants, metal deactivators, antiwear agents, antifoamants,  
7     friction modifiers, seal swell agents, demulsifiers, VI improvers, and pour point depressants;  
8           wherein the ratio the butyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate to the  
9     ditridecyldithiopropionate is in the range of from about 70:30 to about 30:70.

1       10.    The composition of claim 9 wherein the lubricant is a lubricating oil.

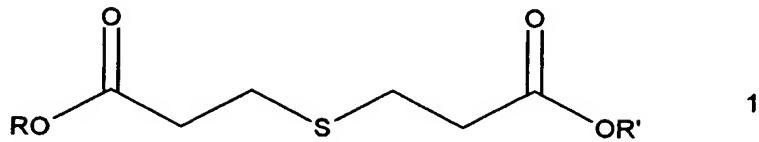
1       11.    A method of increasing the oxidation stability of a lubricant comprising adding thereto  
2     at least a first antioxidant and a second antioxidant, the first antioxidant being a hindered  
3     phenolic and the second antioxidant being a thioether.

**0206-PA**

1       12.     The method of claim 11 wherein the first antioxidant is selected from the group  
2     consisting of 2,4-dimethyl-6-octyl-phenol; 2,6-di-t-butyl-4-methyl phenol (i.e., butylated  
3     hydroxy toluene); 2,6-di-t-butyl-4-ethyl phenol; 2,6-di-t-butyl-4-n-butyl phenol; 2,2'-  
4     methylenebis(4-methyl-6-t-butyl phenol); 2,2'-methylenebis(4-ethyl-6-t-butyl phenol); 2,4-  
5     dimethyl-6-t-butyl phenol; 4-hydroxymethyl-2,6-di-t-butyl phenol; n-octadecyl-beta(3,5-di-t-  
6     butyl-4-hydroxyphenyl)propionate; 2,6-dioctadecyl-4-methyl phenol; 2,4,6-trimethyl phenol;  
7     2,4,6-triisopropyl phenol; 2,4,6-tri-t-butyl phenol; 2-t-butyl-4,6-dimethyl phenol; 2,6-methyl-  
8     4-didodecyl phenol; tris(3,5-di-t-butyl-4-hydroxy isocyanurate, tris(2-methyl-4-hydroxy-5-t-  
9     butylphenyl)butane; octadecyl-3,5-di-t-butyl-4-hydroxy hydrocinnamate;  
10    tetrakis{methylene(3,5-di-t-butyl-4-hydroxy-hydrocinnamate)}methane; 2,2'-oxamido  
11    bis{ethyl-3-(3,5-di-t-butyl-4-hydroxyphenyl)}propionate; 1,2-bis(3,5-di-t-butyl-4-  
12    hydroxyhydrocinnamoyl)hydrazine; 1,3,5-tris(3,5-di-t-butyl-4-hydroxybenzyl)-s-triazine-2,4,6-  
13    (1H,3H,5H)trione; 1,3,5-tris(4-t-butyl-3-hydroxy-2,6-dimethylbenzyl)-s-triazine-2,4,6-  
14    (1H,3H,5H)trione; 1,3,5-trimethyl-2,4,6-tris(3,5-di-t-butyl-4-hydroxybenzyl)benzene; 3,5-di-t-  
15    butyl-4-hydroxyhydrocinnamic acid triester with 1,3,5-tris(2-hydroxyethyl)-5-triazine-  
16    2,4,6(1H,3H,5H)-trione; bis(3,3-bis(4-hydroxy-3-t-butylphenyl)butanoic acid)glycoester;  
17    tetrakis{methylene (3,5-di-t-butyl-4-hydroxy-hydrocinnamate)}methane; and 1,3,5-trimethyl-  
18    2,4,6-tris(3,5-di-t-butyl-4-hydroxybenzyl)benzene.

1       13.     The method of claim 11 wherein the first antioxidant is butyl-3-(3,5-di-tert-butyl-4-  
2     hydroxyphenyl)propionate.

1 14. The method of claim 11 wherein the second antioxidant is a dialkylidithiopropionate of  
2 the structure:



7 wherein R and R' are independently selected from the group consisting of straight chain and  
8 branched chain alkyl groups.

1 15. The method of claim 11 wherein the second antioxidant is ditridecyldithiopropionate.

1       16. The method of claim 11 wherein the ratio the first antioxidant to the second  
2       antioxidant is in the range of from about 70:30 to about 30:70

1        17. The method of claim 11 further comprising at least one additional additive selected  
2                  from the group comprising dispersants, detergents, rust inhibitors, antioxidants, metal  
3                  deactivators, antiwear agents, antifoamants, friction modifiers, seal swell agents, demulsifiers,  
4                  VI improvers, and pour point depressants.

1 18. The method of claim 11 wherein the lubricant is a lubricating oil.

- 1       19.     A method comprising:
- 2           A)    a lubricant;
- 3           B)    butyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate;
- 4           C)    ditridecyldithiopropionate; and, optionally,
- 5           D)    at least one additional additive selected from the group comprising dispersants,
- 6   detergents, rust inhibitors, antioxidants, metal deactivators, antiwear agents, antifoamants,
- 7   friction modifiers, seal swell agents, demulsifiers, VI improvers, and pour point depressants;
- 8           wherein the ratio the butyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate to the
- 9   ditridecyldithiopropionate is in the range of from about 70:30 to about 30:70.
- 1       20.   The method of claim 19 wherein the lubricant is a lubricating oil.